Wireless Communications Systems And Methods For
Contiguously Addressable Memory Enabled Multiple
Processor Based Multiple User Detection

1. A communications device for detecting user transmitted symbols encoded in spread spectrum waveforms (hereinafter "user waveforms") comprising

    a first memory,

    a set of one or more first processing elements, coupled to the first memory, the set of first processing elements generating a matrix (hereinafter "R-matrix") representative of cross correlations among user waveforms and storing that R-matrix to contiguous locations within the first memory.

2. The device of claim 1, comprising

    a second processing element coupled with the first memory,

    the second processing element accessing the R-matrix from contiguous locations within the first memory and generating symbol estimates as a composition of the R-matrix.

3. The device of claim 1, comprising

    a second memory coupled with the set of first processing elements and a third processing element,

    the third processing element generating a matrix (hereinafter "gamma-matrix") representative of a correlation between a code associated with one user and those associated with one or more other users,

    the third processing element places the gamma-matrix in the second memory.

4. The device of claim 3, comprising

    the third processing element generating the gamma-matrix and placing that matrix in contiguous location within the second memory,

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the set of first processing elements accessing the gamma-matrix from contiguous locations within the second memory and generating the R-matrix.

5. The device of claim 3, comprising

a multi-port switch coupled to the third processing element and to the second memory,

the third processing element places the gamma-matrix in the second memory via the data switch.

6. The device of claim 3, wherein the gamma-matrix is a composition of a complex conjugate of the code associated with one user and a complex conjugate of the codes associated with one or more other users.

7. The device of claim 3, wherein the third processing element updates the gamma-matrix as users are added or removed from the spread spectrum system.

8. The device of claim 3, wherein the set of first processing elements generate the R-matrix as a composition of the gamma-matrix.

9. The device of claim 1, comprising

a host controller coupled to each of the set of first processing elements, the host controller generates a partitioning of the R-matrix, that partitioning divides the R-matrix into one or more portions based on a number of users and a number of available processing elements,

the host controller assigns to each first processing element a portion of the R-matrix to generate according to the partitioning,

each of the first processing elements generating the assigned portion of the R-matrix according to the partitioning,

the host re-calculates the partitioning of the R-matrix when a user is added or removed from the spread spectrum system, and assigns a new portion of the R-matrix to each first processing element according to that new partitioning.

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10. The device of claim 9, wherein each first processing element places its respective portion of the R-matrix in the first memory according to its respective partition such that each portion of the R-matrix is contiguous with respect to the other portions.

11. A communications device for detecting user transmitted symbols encoded in spread spectrum waveforms (hereinafter "user waveforms") comprising

a first memory,

a set of one or more first processing elements, coupled to a direct memory access engine (hereinafter "DMA engine"), the set of first processing elements generating a matrix (hereinafter "R-matrix") representative of cross correlations among user waveforms,

the DMA engine coupled with the first memory, the DMA engine storing that R-matrix to contiguous locations within the first memory.

12. The device of claim 11, comprising

a second processing element coupled with the first memory,

the second processing element accessing the R-matrix from contiguous locations within the first memory and generating symbol estimates as a composition of the R-matrix.

13. The device of claim 11 comprising

a second memory coupled with the set of first processing elements and a third processing element,

the third processing element generating a matrix (hereinafter "gamma-matrix") representative of a correlation between a code associated with one user and those associated with one or more other users,

the third processing element places the gamma-matrix in the second memory.

14. The device of claim 11, comprising

the third processing element generating the gamma-matrix and placing that matrix in contiguous location within the second memory,

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the set of first processing elements accessing the gamma-matrix from contiguous locations within the second memory and generating the R-matrix.

15. The device of claim 13, comprising

a multi-port switch coupled to the third processing element and to the second memory,

the third processing element places the gamma-matrix in the second memory via the data switch.

16. The device of claim 13, wherein the gamma-matrix is a composition of a complex conjugate of the code associated with one user and a complex conjugate of the codes associated with one or more other users.

17. The device of claim 13, wherein the third processing element updates the gamma-matrix as users are added or removed from the spread spectrum system.

18. The device of claim 13, wherein the set of first processing elements generate the R-matrix as a composition of the gamma-matrix.

19. The device of claim 11, comprising

a host controller coupled to each of the set of first processing elements, the host controller generating a partitioning of the R-matrix, that partitioning divides the R-matrix into one or more portions based on a number of users and a number of available processing elements,

the host controller assigns to each first processing element a portion of the R-matrix to generate according to the partitioning,

each first processing element generating the assigned portion of the R-matrix according to the partitioning,

the host re-calculating the partitioning of the R-matrix when a user is added or removed from the spread spectrum system, and assigning a new portion of the R-matrix to each first processing element according to that new partitioning.

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20.   The device of claim 19, wherein DMA engine places each portion of the R-matrix in the first memory according to the partitioning such that the each portion of the R-matrix is contiguous with respect to the adjacent portions.

21.   A communications device for detecting user transmitted symbols encoded in spread spectrum waveforms (hereinafter "user waveforms") comprising

a first memory,

a set of one or more first processing elements, coupled to the first memory, the set of first processing elements generating a matrix (hereinafter "R-matrix") representative of cross correlations among user waveforms and storing that R-matrix to contiguous locations within the first memory

a second processing element coupled to the first memory, the second processing element accessing R-matrix from contiguous location within the first memory and generating symbol estimates as a composition of the R-matrix.

22.   The device of claim 21 comprising

a second memory coupled with the set of first processing elements and a third processing element,

the third processing element generating a matrix (hereinafter "gamma-matrix") representative of a correlation between a code associated with one user and those associated with one or more other users,

the third processing element places the gamma-matrix in the second memory.

23.   The device of claim 22, comprising

the third processing element generating the gamma-matrix and placing that matrix in contiguous location within the second memory,

the set of first processing elements accessing the gamma-matrix from contiguous locations within the second memory and generating the R-matrix.

24.   The device of claim 22, comprising

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a multi-port switch coupled to the third processing element and to the second memory,

the third processing element places the gamma-matrix in the second memory via the data switch.

25. The device of claim 22, wherein the gamma-matrix is a composition of a complex conjugate of the code associated with one user and a complex conjugate of the codes associated with one or more other users.

26. The device of claim 22, wherein the third processing element updates the gamma-matrix as users are added or removed from the spread spectrum system.

27. The device of claim 22, wherein the set of first processing elements generate the R-matrix as a composition of the gamma-matrix.

28. The device of claim 21, comprising

a direct memory access engine (hereinafter "DMA engine") coupled with the set of second processing elements and the first memory,

the DMA engine placing the R-matrix in contiguous locations within the first memory.

29. The device of claim 21, comprising

a direct memory access engine (hereinafter "DMA engine") coupled with the third processing element and the second memory,

the DMA engine placing the gamma-matrix in contiguous locations within the second-memory.